



# Water Quality Standards Human Health Criteria Public Workshop

Alaska Department of Environmental Conservation  
Division of Water- Water Quality Standards



# Division of Water

Mission Statement: **Improve and Protect Alaska's Water Quality**

How?

- 💧 **Establishes standards for water cleanliness**
- 💧 Regulates discharges to waters and wetlands
- 💧 Provides financial assistance for water and wastewater facility construction and waterbody assessment and remediation
- 💧 Trains, certifies, and assists water and wastewater facility system operators
- 💧 Monitors and reports on water quality



# Human Health Criteria

- 💧 Human Health Criteria “101”
- 💧 History of Regulation(s) and Purpose of Updates
- 💧 What DEC is hoping to achieve with this Workshop



# Outline of this Workshop: Day 1

- 💧 Ground Rules and Expectations
- 💧 Introduction to human health criteria (HHC) issue
- 💧 Current issues from a National Perspective
- 💧 Relationship to Fish Consumption Advisories
  - 💧 Lunch
- 💧 Introduction to HHC formula
- 💧 Introduction to Dietary Surveys
- 💧 State experience: Idaho and Washington
  - 💧 Panel Discussion



# Outline for this Workshop: Day 2

- 💧 DEC Efforts to date
  - 💧 Fish Consumption Research Literature Review
- 💧 Tribal Efforts to Quantify Fish Consumption: Tribal Village of Seldovia
- 💧 ADF&G Efforts to collect fish harvest data and relevance to FCR
  - 💧 Break
- 💧 Implementation of new HHC: Existing and Potential options
- 💧 Lunch
- 💧 Tribal Panel Discussion
- 💧 Break-out Groups- feedback on specific issues of concern

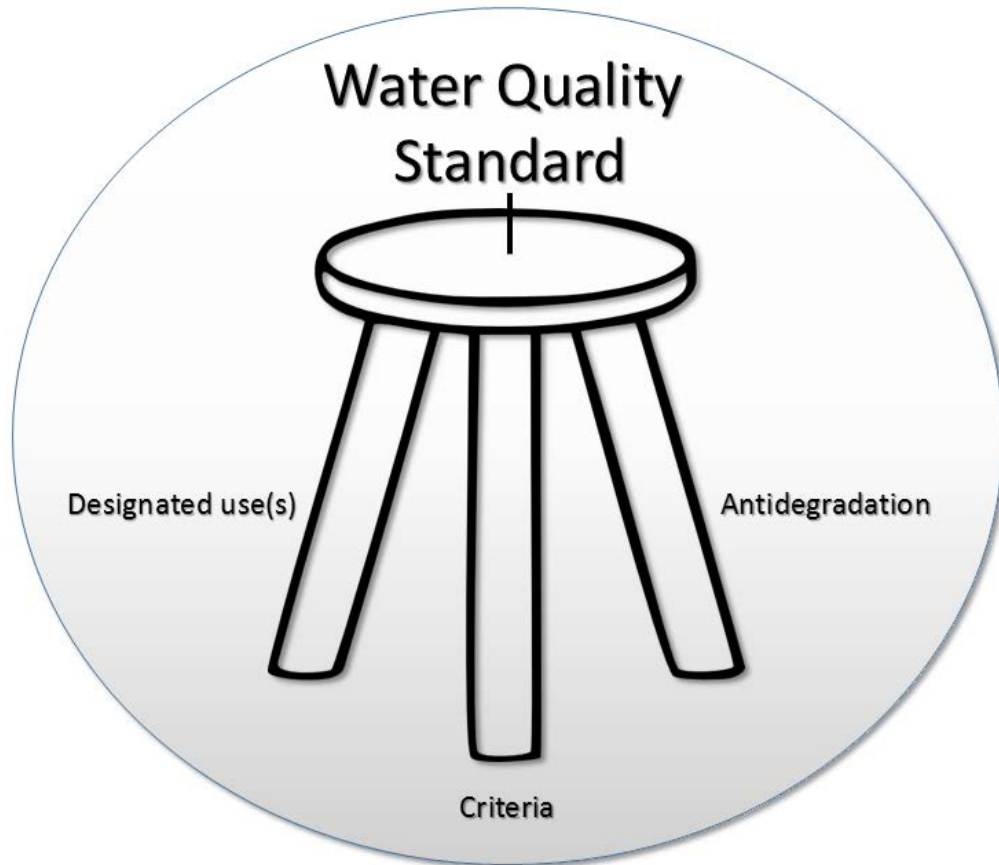


# Ground Rules for the Public Workshop

- 💧 DEC understands that many different interests will be represented, and that it might not be possible to come to consensus on different issues
- 💧 Regardless of the degree of consensus attained, all information and recommendations will be of value to DEC in the process.
- 💧 Be Respectful of all participants at all times- this is an issue of importance to all of us for different reasons

# Foundation of a Water Quality Standard

*-Defined-*



1. **Designated Uses** – how water is used (e.g. recreational, industrial, aquatic life)
2. **Criteria** - are numeric or narrative values. Consider how much and how long you may be exposed to a substance or condition
3. **Antidegradation** –process for protecting high quality waters





# What are Water Quality Standards (WQS)

- 💧 Identified at 18 AAC 70 in Regulation
- 💧 The foundation of state/tribal water quality-based pollution control programs under the Clean Water Act (CWA)
- 💧 Are designed to protect public health or welfare (*designated use*)
- 💧 Provide maximum (generally) concentration of a particular pollutant in the water (*criteria*)
- 💧 Help identify polluted waters; clean-up polluted water, and make sure our waters don't get more polluted



## Where do Water Quality Standards (and discharge limits) apply?

(AS 46.03.900) "Waters" include lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, straits, passages, canals, the Pacific Ocean, Gulf of Alaska, Bering Sea, and Arctic Ocean, in the territorial limits of the state, and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt, which are wholly or partially in or bordering the state or under the jurisdiction of the state.

(18 AAC 70.020(b)): [t]he water quality standards regulate human activities that result in alterations to **waters** within the state's jurisdiction.

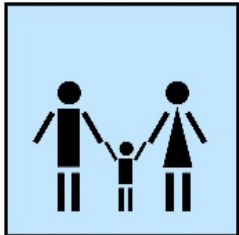
# Human Health Criteria

Presentation #1: An introduction to the issue

# Human Health Criteria (HHC)



- A human health criterion is the highest concentration of a pollutant in surface water that is not expected to pose a significant risk to human health
  - designed to **minimize the risk** of adverse effects from exposure to different contaminants
  - Based on a **chronic (lifetime) exposure** to contaminants
  - Includes **the ingestion of drinking water** from surface water sources and/or
  - The **consumption of aquatic life** obtained from surface waters.



## What are HHC (cont.)

- 💧 Human Health Criteria consider two different exposure scenarios
  - 💧 Marine Waters (Consumption of aquatic organisms only)
  - 💧 Freshwaters (Consumption of aquatic organisms & ingestion of surface water)
  
- 💧 Several factors to consider...
  - 💧 Population of concern
  - 💧 Mode of effect of the contaminant (acute v. chronic, carcinogenic, etc.)
  - 💧 Definition of “aquatic life” and where does your meal come from?
  - 💧 Other exposure issues and sources of contaminants (e.g. air)

# When does HHC apply- Designated Use?



HHC are tied to the designated uses

- 💧 ***Drinking water***
- 💧 ***Growth and propagation of fish, shellfish, other aquatic life and wildlife***
- 💧 ***Harvesting for consumption of raw mollusks or other raw aquatic life***
- 💧 Removal or modification of uses and/or criteria may be subject to a high level of scrutiny when 303(c) fishable/swimmable uses

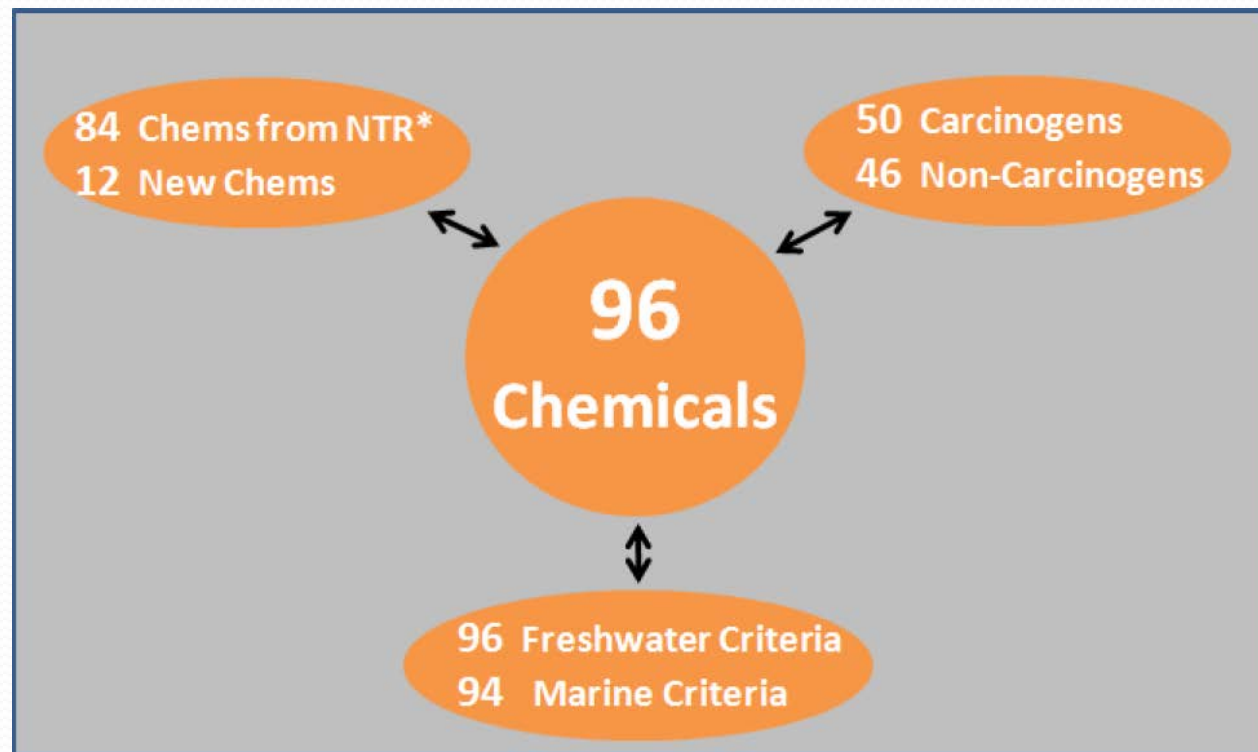


## Historical Context: National

- 💧 1980 – EPA derived 64 recommended HHC. Criteria were based on national dietary information (where 6.5 g/day comes from)
- 💧 1992 - National Toxics Rule promulgated carcinogens for Alaska
- 💧 2000 - New HHC methodology was published.
  - 💧 Updated FCR to 17.5 g/d
  - 💧 Subsistence user value of 142.4 g/d
- 💧 2002 – 2015 Updated HHC based on 2000 methodology
  - 💧 Includes updated toxicity values for 122 different pollutants
- 💧 2015 - Updates to exposure rates including FCR to 22.0 g/day

## How do the 2015-recommended HHC compare with existing HHC?

- There are revised criteria for 96 chemical pollutants
  - 70% of the 2015 HHC are lower concentrations than 1980 criteria
  - 30% of the 2015 HHC are equal in concentration to 1980 criteria
  - Numerous pollutants were not updated at this time (e.g., PCBs, metals)





# HHC in the Inorganic Toxics Criteria Worksheet

Enter the appropriate **Hardness** value for the water you are interested in: **30** mg/L as CaCO<sub>3</sub> \*\*\*\*

## Calculation of Hardness

adapted from Standard Methods, Method 2340B

units in mg/L

input calcium and magnesium concentrations:

Calcium: 3.28

Magnesium: 10.4

Resulting Hardness= 51.0

color key: orange highlighting: the most stringent criterion

yellow highlighting: the criterion depends on the hardness

all units in micrograms per liter (ug/L)

all units in micrograms per liter (ug/L)

Parameter	Drinking Water	Stockwater	Irrigation Water	Aquatic Life-Fresh Water										Human Health Criteria for NonCarcinogens	
				Acute					Chronic					Water + Aquatic Organisms	Aquatic Organisms Only
				the criterion is	as	using the conversion factor	the criterion is	as	the criterion is	as	using the conversion factor	the criterion is	as		
alkalinity									20,000 minimum						
aluminum			5,000	750	TR				87	TR					
antimony	6													14	4,300
arsenic	10	50	100	340	TR	1	340	D	150	TR	1	150	D		
barium	2,000														
beryllium	4		100												
boron			750												
cadmium	5	10	10	0.63	TR	0.994	0.62	D	0.11	TR	0.959	0.11	D		
chloride				860,000					230,000						
chlorine (total residual)				19					11						
chromium (total)	100		100												
chromium III				672.62	TR	0.316	212.55	D	32.15	TR	0.86	27.65	D		
chromium VI		50		16	D				11	D					
cobalt			50												
copper			200	4.50	TR	0.960	4.32	D	3.33	TR	0.960	3.20	D	1,300	
cyanide (as free CN)	200 *			22 **					5.2 **					700	220,000

# Why is Alaska interested in the HHC issue?

- 💧 Clean Water Act requires states to adopt updated criteria when new information is available
- 💧 Alaska is subject to the promulgated National Toxics Rule
  - 💧 Not based on Alaska-specific or even Northwest data
- 💧 Criteria must be scientifically defensible



# What has DEC heard or learned to date?

- Comments submitted in Triennial Review process call of a revision

- Existing values are outdated
- Desire for the state to adopt Alaska-specific values

- Litigation in Northwest

- Concerns from the regulated community that potential revisions may be very difficult to meet in the short term

- May not be the right mechanism for reducing toxics in the environment
- \$\$\$\$\$



## Goals of this rule-making?

- 💧 **Ensure water quality standards are protective of human health** so our fish, shellfish, and drinking waters (surface) remain clean and healthy to consume;
- 💧 **Apply a regulatory process based on a realistic timeframes** to allow dischargers to reduce pollutants and still be in compliance while they are doing their work; and
- 💧 **Acknowledge that there are technology limitations** and give recognition that non-permitted sources may be a significant part of the problem with being able to meet the criteria.



# Who else is working on this issue?

- 💧 Florida: Started this process in 2003. Awaiting EPA response on 2015 package
- 💧 Washington: Began work in 2011. Working on draft package...
- 💧 Idaho: Began work in 2011. Working on a draft package...
- 💧 Maine: HHC were disapproved of in 2015 for not being protective of tribal populations  
Currently being litigated (Maine v. EPA)
- 💧 EPA-Region 10: May promulgate criteria for WA if state doesn't meet a September deadline
- 💧 Numerous tribes...both in Alaska and Northwest

# Break

- Questions?

## 4 Equations to Calculate Human Health Criteria

### Input Variables (2015 recommended)

**BW** = Human Body Weight (adult = 80 kg = 176 lbs)

**DI** = Drinking Water Rate (2.4 liters/day)

**CSF** = Cancer Slope Factor (mg/Kg-day) AKA (RSD)

**FCR** = Fish Intake Rate (? grams/day)

**BCF/BAF** = Bioconcentration v. bioaccumulation factor (L/Kg, chemical specific)

**RfD** = Reference Dose, Non-Carcinogens (mg/Kg-day)

**RL** = Risk Level ( $10^{-5}$ ) in Alaska (EPA uses  $10^{-6}$ )

**RSC** = Relative Source Contribution

	Freshwater Criteria (Consumption of Organisms and Water)	Marine Criteria (Consumption of Organisms <b>Only</b> )
Criteria for Carcinogens	$\frac{RL \times BW}{CSF \times [(FCR \times BCF) + DI]}$	$\frac{RL \times BW}{CSF \times FCR \times BCF}$
Criteria for Non- Carcinogens	$\frac{RfD \times RSC \times BW}{(FCR \times BCF) + DI}$	$\frac{RfD \times RSC \times BW}{FCR \times BCF}$

Slide Images and Inspiration courtesy of  
Washington Ecology